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IV. *Observations upon the Generation of Plants, in a Letter to Sir Hans Sloane, Bart. Pr. Coll. Med.* By Patrick Blair, M. D. F. R. S.

Boston, Dec. 31. 1721.

Honoured Sir,

IT is no small Satisfaction, that what I advanced in my *Botanick Essays* is now so fully confirm'd by Experiments made by some curious Gardeners, among whom is Mr. *Philip Miller*, who writes me,

November 11, 1721.

I. That in Pursuance of my Advice he separated the Male Plants of the Spinage from the Female; the Consequence was, that the Seeds did swell to the usual Bigness; but when he sow'd it, it did not grow afterwards. He searched into the Seed, and found it wanted the *Punctum Vitæ*, which perhaps might have been the Case with Mr. *Geoffroy*; but if not, the female *Embryones* might have been impregnated another Way, as he experimented with twelve Tulips, which he set by themselves about six or seven Yards from any other, and as soon as they blew, he took out the *Stamina* so very carefully, that he scattered none of the Dust, and about two Days afterwards, he saw Bees working on Tulips, in a Bed where he did not take out the *Stamina*, and when they came out, they were loaded with the Dust on their Bodies and Legs: He saw them fly into the Tulips, where he had taken out the *Stamina*, and when they came out, he went and found they had left behind them

them sufficient to impregnate these Flowers, for they bore good ripe Seed ; which persuades him, that the *Farina* may be carried from Place to Place by Insects, and when they happen upon a Flower, whose *Uterus* is capable to be impregnated by such a Dust, it may be thus effected.

I am of Opinion, this will not suit with Mr. *Morland's* Scheme. For tho' we may suppose the *Stamina* of every Flower to be loaded with a due Proportion of the *Farina*, yet this accidental Conveyance of it to a neighbouring Flower, may be rather less than greater than is necessary: So that, if wanting, then those *Embryones*, which had not received its determined Particle into their Bosom, must be defective in Bulk, or barren in growing, but here all were equally fill'd.

2. By a Second Letter, *October 19. 1721.* he informs me, that he bought a Parcel of *Savoy* Seeds of a Neighbour, which he sowed, and planted out the Plants ; but was surprized to see the Production : For he had half of them red Cabbages, and some white Cabbages, and some Savoys with red Ribs, and some neither one Sort nor other, but a Mixture of all Sorts together in one Plant. He went to the Gardiner and told him his Tale, who shew'd him, that he was in the same Condition, but did not know how it should come to pass, for he was sure he took special Care in saving of the Seed. Being ask'd how and where he planted them for Seed, he shew'd him them under a *South-West* Hedge, and told him the Manner in which he planted them. First, a Dozen of white Cabbages, then a Dozen of Savoys, and then a Dozen of Red. Then he immediately thought how it came to pass, by the *Effluvia*

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impregnating the *Uterus* of one another ; and it is very common for our Gardiners to plant white and red Cabbages together for Seed, and they are as often disappointed by having a Degeneracy of both Kinds, which they attribute to the Soil, and think that is the Cause : They send to *Holland* for a fresh Supply of Seeds, and say our Soil will not continue that Sort Good. He told them his Opinion, and they laugh at him for it, and will not be turn'd out of their Road, although they should have never so many Experiments shew'd them.

This Experiment is a most convincing Argument for the *Effluvia* ; for did each Grain of the *Farina* enter the *Pistillum* to its proper *Uterus*, this mongrel Kind would never be produced. For if the individual Plant be in each Grain of the Male *Farina*, how can it be so far dismember'd, as that one Part shall go to the making up of the Ribs of red Cabbage, and another to compose the rest of a Savoy Plant. Analagous to this, is what I lately observ'd in a Spaniel Bitch, of so good a Kind, that when she became proud, Care was taken to let her have good Dogs. The Litter she produced, consisted of Puppies some Piebald, like one of the Dogs that had lin'd her, of the same Shape, Colour and Spots ; others like another ; and a third partaking of both, with Spots from the Bitch interspers'd. This is a farther Confirmation of what I have advanc'd, Essay 4. where Page 310. I only assert, that several Foetus's partake equally of Male and Female ; but here two Males concur with one Female in the Composition of a fourth Body, made up of all the three : And one Seed produces a Cabbage consisting of three different Species, which could never happen, did these organiz'd *Animalcula*, or Granules of the *Farina*, become

come a *Fœtus*, or contain the *Folia Seminalia* of a Plant. This methinks is sufficient to answer what the ingenious Mr. *Bradley* has so strenuously contend ed for, *Works of Nature*, p. 9. & seq. But since that worthy Gentleman has not thought fit to answer what I have already advanc'd upon that Subject, I may hereafter answer his Objections more at large.

I could descant yet more upon this Observation, and consider how far this may lead us into the infinite Variegations and Stripes, in not only annual Flowers, such as Poppies, *Consolida Regalis*, and Bottles, but also in perennial Roots; such as *Auricula's*, *Cousslips*, &c. of a lower Size, which is hinted by Mr. *Bradley*; he having received that Notion from the ingenious Mr. *Du Bois*, as I have been credibly informed; and in Plants of a larger Size, not of a Bulbous, but Carnous Root, such as *Columbines*; where there is a vast Variety: And in this Plant it is most especially to be observed, that though the indigenous one, from which all the other seem only to be Variations, and not determinate Species, be of a blue Colour, consisting of ten Alternate Petala, viz. five corniculate, and five plain; yet into how many other Kinds of Flowers is it subdivided; such as pale yellow, with bluish red, purple, dark Stripes vastly double, blue, blackish red, &c. Some with Corniculate Petala, and some only with plain, and how in single Flowers it imitates all the Colours we see Pigeons endow'd with. I say it is worthy of Consideration, whether the *Farina* may do this, since I do not understand there has been much Art used in making these Flowers break, as Tulips, or to cultivate a Set of Breeders; but that a richer Soil may produce a double Flower; and a suitable Loam may produce the Variety of Colours; the *Farina*

from several Flowers may occasion the Stripes, and the *Stamina* arising from the plain *Petala*, rather than the *Cornicula*, pouring out the *Farina*, may cause the Flowers with the plain *Petala*. So that were I to extend this to a great many other Plants, and were there proper Observations made upon them, considerable Improvements might be made upon this Doctrine of the Sexes of Plants. For after the Flowers, we come next to the Variegation of the Seed of some Plants, particularly the *Phaseoli*, whose various Spots and Colours, and even the Bigness too, may very much depend upon the *Effluvia* from the *Farina*, when several Kinds are sown together. For do but consider three plain Colours, a White, Red, and dark Blue, and you may observe how many Descendants, and what a Variety of Spots may proceed from them. The Lupines also in some Measure may be brought in here, and I know not but that the *Medica Cochleata Falcata Lunata*, may be multiply'd in its Variations after the same Manner. But it is Time to proceed to another Experiment of my Correspondent Mr. Miller.

Being persuaded to it by an ingenious Gardiner, he pull'd off all the Male-Flowers of some Melon Plants so soon as they appeared; but instead of finding, as his Friend informed him, that these Flowers exhausted the Nourishment from the Fruit; he found that, without these Flowers, none of the Melons would grow, so that he was deprived of the Fruit which he expected.

As this Experiment is a plain Indication of the Necessity of the *Farina*, so it confirms the Use I have assign'd to the Leaves, *viz.* that by entering the Capillaries of the Leaves, and returning, the nutritive Particles may be more attenuated: So here, the *Petala*
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of the Male-Flowers may serve for the same Purpose, for by the Largeness of the *Tubuli* in these *Pomifera Scandentes*, a gross viscid Sap is received, which even the Leaves themselves are not sufficient to attenuate, so as to be fit for composing the more subtile Part of the Fruit; until by repeated Circulation through the *Petala* of the Male-Flowers, it may be render'd fit for such a Purpose. Indeed, the Female-Flowers upon the Top of the *Rudimentum Fructus*, may in some Measure serve for this Purpose. But as the Male-Flowers are, generally speaking, more numerous than the Female, so their being remov'd must deprive the *Embryones* of a very great Assistance towards its being perfected: I may add, that the Orifices of the Pedicles, when the Flowers are pull'd off, must lose so much of the Sap, that the whole Plant must be thereby so impoverish'd, as not to be able to bring forth the design'd Fruit; all this, beside the Want of the considerable Supply of the *Farina Facundans*.

I design'd to have given a few Thoughts concerning the Variegation of Leaves and Flowers, being unwilling to admit of Mr. *Bradley's* Sickness or Weakness of the Sap: But I shall reserve that to a more convenient Opportunity, being at present intent upon making some farther Improvements upon the Generation and Nourishment of Plants, which I hope to have well confirm'd by Experiments made by my good Correspondents the Gardiners, especially this Mr. *Mil-ler* and my self. I shall expect your Sentiments of these, which will be a great Encouragement to proceed, to

Your Most Oblig'd,

P A. B L A I R.,